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Revision 0

Decontamination Plan for Group 3, PM-2A Tank V-14 Treatment, Test Area North, Waste Area Group 1, Operable Unit 1-10

Idaho Cleanup Project

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Idaho Cleanup Project
Idaho Falls, Idaho 83415

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Approved by

Dave F Nickelson — 5/10/05

David F. Nickelson — Date
PM-2A Project Engineer

5/10/05

Alan K. York — Date
PM-2A Project Manager

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ABSTRACT

This decontamination plan identifies the methods and techniques planned to facilitate the decontamination required in support of PM-2A tank treatment and disposal at ICDF. This plan identifies general decontamination methods and decontamination criteria for tanks, equipment, tools and waste containers.

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TABLE

ACRONYMS

CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	Code of Federal Regulations
EPA	U.S. Environmental Protection Agency
ESD	explanation of significant differences
HASP	health and safety plan
HWMA	Hazardous Waste Management Act
ICDF	INEEL CERCLA disposal facility
INEEL	Idaho National Engineering and Environmental Laboratory
INL	Idaho National Laboratory
MCP	management control procedure
MLLW	mixed low-level waste
OU	operable unit
PCB	polychlorinated biphenyl
PRD	program requirements document
RCM	radiological controls manual
RCRA	Resource Conservation and Recovery Act
RD/RAWP	remedial design/remedial action work plan
ROD	record of decision
SSSTF	Staging, Storage, Sizing, and Treatment Facility
TAN	Test Area North
TSCA	Toxic Substances Control Act
TSF	Technical Support Facility
USC	U.S. Code
WMP	waste management plan
WRRTF	Water Reactor Research Test Facility

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1. INTRODUCTION

This Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) (42 U.S. Code [USC] 9601 et seq., 1980) decontamination plan identifies the methods and techniques required to facilitate the decontamination activities for the Phase 2 PM-2A V-14 tank treatment and disposal. Decontamination of equipment, tools, and waste container outer surfaces may be required. This decontamination plan encompasses treatment and disposal of Tank V-14 at the ICDF as covered in Addendum 2 to the RD/RAWP for the PM-2A tanks (DOE/NE-ID 2005b). This CERCLA decontamination plan addresses additional regulatory requirements including the Resource, Conservation, and Recovery Act (RCRA) (42 USC 6901 et seq., 1976) and Toxic Substances Control Act (TSCA) (15 USC 2601 et seq., 1976).

2. PM-2A TANKS DESCRIPTION

The PM-2A tanks were installed in the mid-1950s to store low-level radioactive waste from the Test Area North (TAN)-616 evaporator and later as feed tanks for the PM-2A temporary evaporator. The PM-2A tanks were removed from service in 1975. The PM-2A evaporator was decontaminated and decommissioned in the early 1980s. The location of the PM-2A tanks site is shown on Figure 2-1.

The PM-2A tanks site (Figure 2-2) was comprised of two abandoned 50,000-gal, carbon-steel, underground storage tanks, their concrete cradles (sand filled containment troughs), feed piping, the waste contents of the tanks, and contaminated soils associated with the tanks. Each tank is 12.5 ft in diameter and 55 ft in length, and was laid horizontally in a v-shaped concrete cradle, the bottom of which was located approximately 27 ft underground. The tops of the tanks were originally 14 ft below the ground surface. Most of the liquid waste was removed from the tanks by the end of 1981, leaving heels of wet, mixed-waste residual material. The east tank, Tank V-13 (also known as TK-710 or the east tank), contained approximately 46,530 lb of diatomaceous earth and sludge and the west tank, Tank V-14 (also known as TK-709), contained about 46,030 lb based on actual tank weights recorded at the time of removal from the TSF-26 area. Tank V-14 contained visible free liquid overlying portions of the sludge diatomaceous earth material. The diatomaceous earth was deposited into each tank in 1981 to absorb the remaining liquid (see Figure 2-2).

The waste remaining in the tanks is F001-listed mixed low-level waste (MLLW) contaminated with radionuclides, heavy metals, and organic compounds. The sludge material in V-14 is listed waste based on the use of chlorinated solvents (primarily tetrachloroethylene). Recent sampling data indicate the sludge in V-14 will require treatment prior to disposal.

Phase 1 of the PM-2A tanks remediation project consisted of excavation and removal of tanks from the TSF-26 area, storage of the tanks in the TAN-607A High Bay, transport of the tanks from TAN to the ICDF for final disposal. Details of Phase 1 are discussed in PM-2A RD/RA WP Addendum 1, Rev. 1. Phase 2 treatment and disposal of the V-14 tank at the ICDF is covered in PM-2A RD/RAWP Addendum 2 (DOE/NE-ID 2005b). See figure 2-3 for the treatment location at ICDF. Additional information on the PM-2A tanks and planned remedial actions can be found in the RD/RAWP Addendum 1, Rev. 1 (DOE/NE-ID 2004), RD/RAWP Addendum 2 (DOE/NE-ID 2005b) and supporting documents (DOE-ID 2004b; INEEL 2004a).

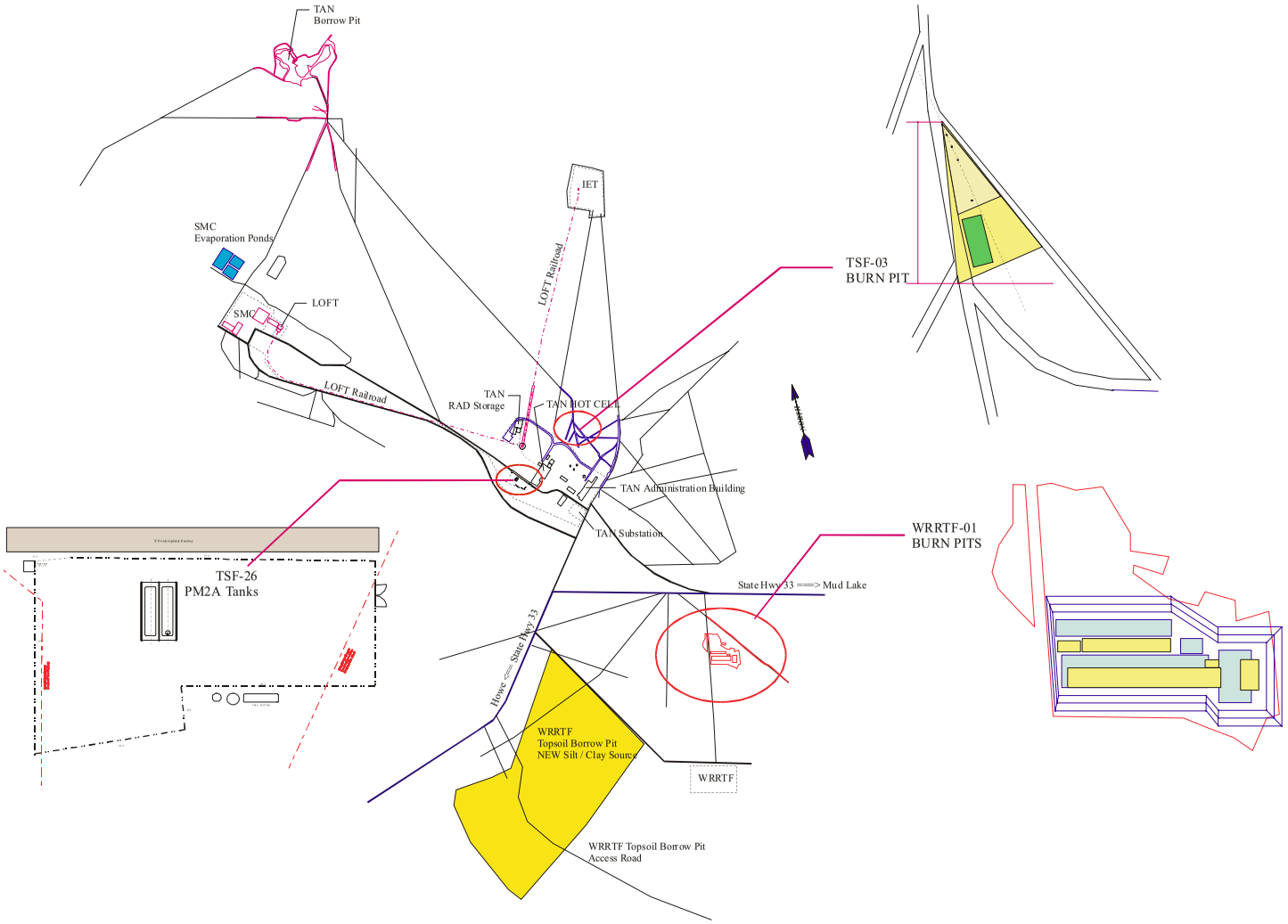
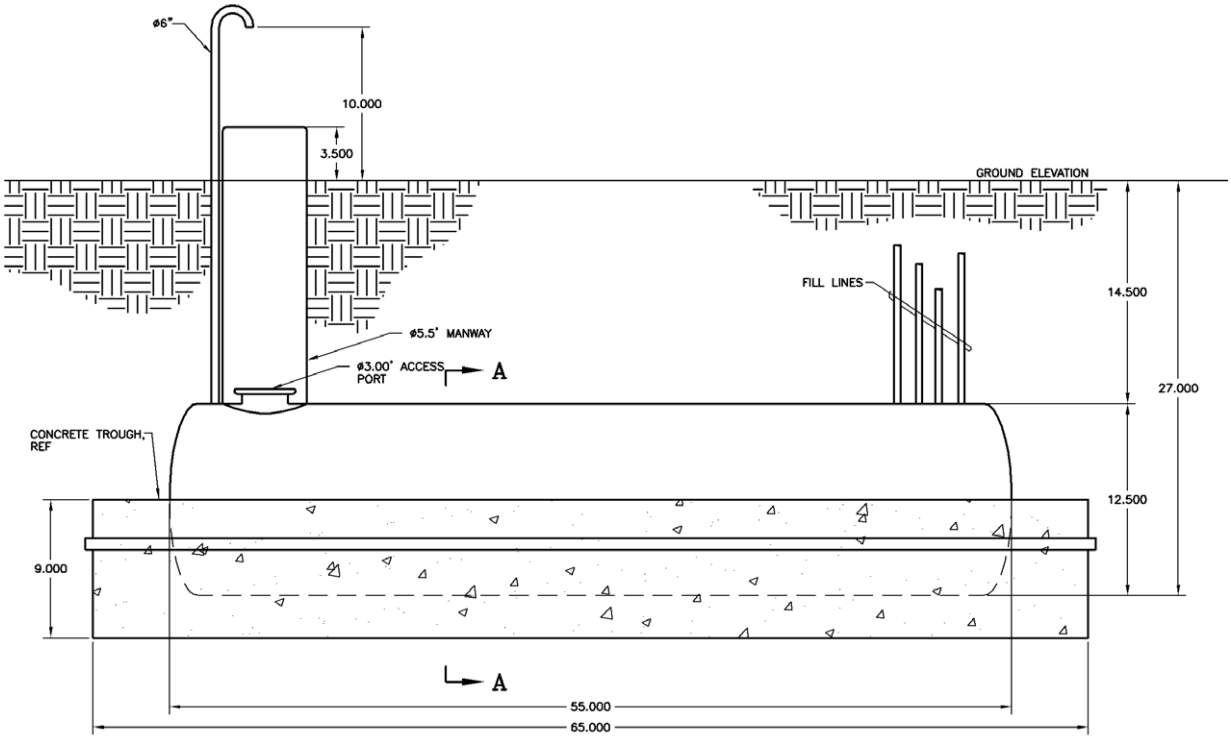
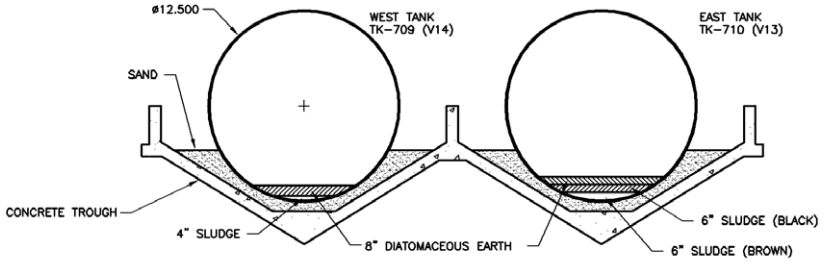


Figure 2-1. Location of the PM-2A tanks site and TSF-03 at Test Area North.



a. Elevation: Looking West at Tank 710



Note: The sludge layers were measured before the diatomaceous earth was deposited.

b. Section A–A: Looking North

Figure 2-2. PM-2A tanks former configuration.

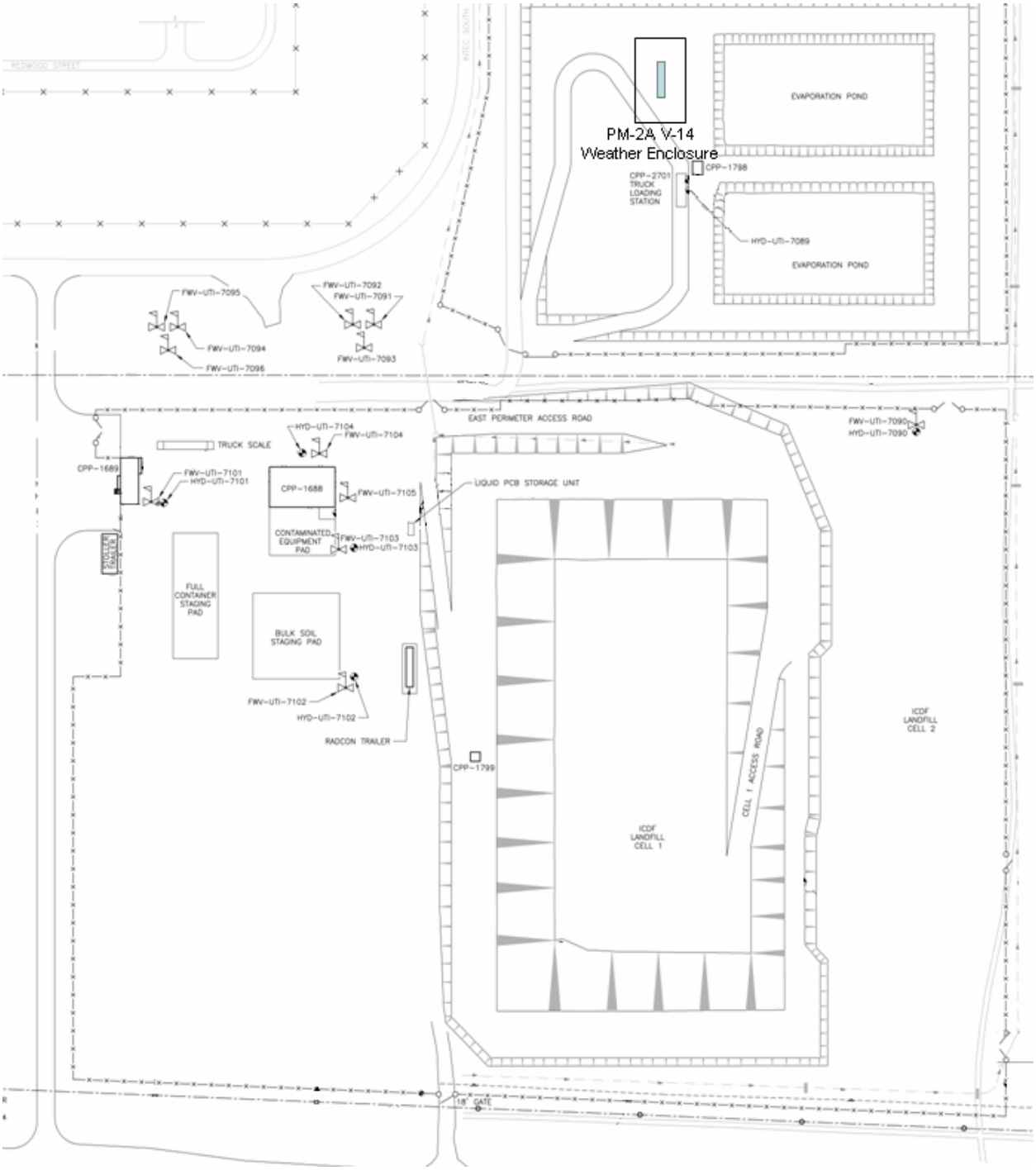


Figure 2-3. ICDF layout.

2.1 Remedial Action

2.1.1 PM-2A Tanks

The remedy selected for the OU 1-10 ROD was modified in a 2004 ESD (DOE-ID 2004a) and in a 2005 explanation of significant differences (ESD) (DOE/NE-ID 2005a) to reflect the need for treatment, an accelerated cleanup approach at TAN, change in treatment location and treatment methodology. Rather than removing the waste inventory and treating as necessary, decontaminating the tanks and leaving the tanks in place, the tanks were removed with the waste inventory in the tanks, the waste inventory in V-14 will be treated and the tanks and the waste disposed of as CERCLA remediation-derived waste at the ICDF. Phase 2 waste treatment and disposal is addressed the RD/RA WP Addendum 2.

Details of the V-14 treatment, including the sequence of the treatment activities, are provided in the remedial design section of the RD/RAWP Addendum 2 (DOE/NE-ID 2005b). Phase 2 remediation of the PM-2A tanks site includes: installing and operating the V-14 treatment system at the ICDF area, performing confirmation CERCLA tank contents sampling of the treated waste, disposing of the tank and treated waste contents, backfilling and compacting the secondary containment excavation, and decontaminating the operating and heavy equipment, as necessary.

3. DECONTAMINATION OBJECTIVES AND PERFORMANCE CRITERIA

The following sections of the decontamination plan address the CERCLA, Resource Conservation and Recovery Act (RCRA), and radiological objectives for decontaminating the equipment associated with Phase 2 PM-2A V-14 tank treatment. The decontamination will be performed to remove hazardous constituents and radioactive materials from tank treatment equipment, tools, and heavy equipment.

3.1 Decontamination Objectives

The objective of heavy equipment decontamination is to free release the equipment for unrestricted use. Equipment cleaning, as discussed in Section 4, and radiological survey(s) to determine the effectiveness of decontamination will be performed. Iterative steps of cleaning and surveying may be necessary to release the equipment for unrestricted use. Potentially contaminated equipment will not be released until required radiation and contamination surveys have been completed in accordance with *INEEL Radiological Controls Manual* (RCM) (Program Requirements Document [PRD]-183), and detailed in Management Control Procedure (MCP)-425, "Surveys of Materials for Unrestricted Release and Control of Movement of Contaminated Material." A surface is considered contaminated if either the removable or the total surface contamination exceeds the values listed in Table 3-1. Heavy equipment contamination during tank movement to the ICDF landfill will be minimized by placing clean fill in the landfill access prior to starting work or by using shielding methods to protect the equipment. Equipment (or pieces of equipment) that cannot be decontaminated to meet the performance criteria as specified in Section 3.3, will be managed as waste in accordance with the project waste management plan (WMP) developed for these actions (INEEL 2004a).

3.1.1 PM-2A Tanks

As discussed in Section 2.1 of this plan, the tanks contain MLLW (hazardous waste and radioactive materials). Therefore, the objective of decontaminating the equipment used during the treatment activities is to decontaminate any contaminated equipment such that it meets the release criteria for unrestricted use. Equipment that contacts contaminated media and cannot be cleaned to meet the unrestricted release criteria can only be used in contaminated areas or as necessary disposed as low-level waste or mixed low-level waste.

Table 3-1. Summary of surface contamination values.[a]

Nuclide	Removable (dpm/100 cm2)[b,c]	Total (Fixed + Removable) (dpm/100 cm2)[b,d]
U-natural, 235U, 238U, and associated decay products	1,000 alpha	5,000 alpha
Transuranics, 226Ra, 228Ra, 230Th, 228Th, 231Pa, 227Ac, 125I, 129I	0[e]	0[e]
Th-natural, 232Th, 90Sr, 223Ra, 224Ra, 232U, 126I, 131I, 133I	200	1,000
Beta-gamma emitters (nuclides with decay modes other than alpha emission or spontaneous fission) except 90Sr[f] and others noted above. Includes mixed fission products containing 90Sr[f]	1,000 beta-gamma	5,000 beta-gamma
Tritium organic compounds, surfaces contaminated by tritium, and tritiated water vapor[g]	10,000	N/A

a. Except as indicated in footnote g below, the values in this table apply to radioactive contamination deposited on, but not incorporated into the interior of, the contaminated item. Where contamination by both alpha- and beta-gamma-emitting nuclides exists, the limits established for the alpha- and beta-gamma-emitting nuclides apply independently (see 10 Code of Federal Regulations [CFR] 835, Appendix D).

b. As used in this table, dpm means the rate of emission by radioactive material as determined by correcting the counts per minute observed by an appropriate detector for background, efficiency, and geometric factors associated with the instrumentation.

c. The amount of removable radioactive material per 100 cm2 of surface area will be determined by swiping the area with dry filter or soft absorbent paper while applying moderate pressure and then assessing the amount of radioactive material on the swipe with an appropriate instrument of known efficiency. (However, the use of dry material may not be appropriate for tritium.) For objects with a surface area less than 100 cm2, the entire surface will be swiped, and the activity per unit area will be based on the actual surface area. The use of swiping techniques is not necessary to measure removable contamination levels if direct scan surveys indicate that the total residual contamination levels are below the values for removable contamination (see 10 CFR 835, Appendix D).

d. The levels may be averaged over 1 m2 provided the maximum activity in any area of 100 cm2 is less than three times the values in Table 3-1. For the purposes of averaging, any square meter of surface shall be considered to be above the surface contamination value if: (1) from measurements of a representative number of sections, the average contamination level is determined to exceed the applicable value or (2) the sum of the activity of all isolated spots or particles in any 100-cm2 area is determined to exceed three times the applicable value in Table 3-1 (see 10 CFR 835, Appendix D).

e. Items to be released exceeding the values specified require an evaluation to be performed and documented:

• If the removable contamination is less than 20 dpm/100 cm2, the item may be released.

• If the total beta-gamma contamination is less than 100 dpm/100 cm2, the item may be released.

• Any items with total TRU alpha contamination will not be released.

f. These values will be applied to total Sr-90/Y-90 activity resulting from processes involving the separation or purification of Sr-90. For mixed fission products containing Sr-90:

• If the Sr-90 fraction is 50% or less of the total activity, the mixed fission product surface activity values apply.

• If the Sr-90 fraction is between 50% and 90% of the total activity, the surface radioactivity values should be

3000 dpm/100 cm2 total and 600 dpm/100 cm2 removable.

• If the Sr-90 fraction exceeds 90% of the total activity, the Sr-90 surface activity values apply (RCTP 96-02).

g. Tritium contamination may diffuse into the volume or matrix of materials. Evaluation of surface contamination shall consider the extent to which such contamination may migrate to the surface to ensure that the surface radioactivity value provided in this table is not exceeded. Once this contamination migrates to the surface, it may be removable, not fixed; therefore, a “Total” value does not apply (see 10 CFR 835, Appendix D).

3.2 Performance Criteria

3.2.1 PM-2A Tanks

The PM-2A V-14 tank was transported to the ICDF for treatment.

The performance criteria developed for free release and reuse of decontaminated equipment are:

- No visible waste-related residue
- No radioactive contamination above RCM (PRD-183) unrestricted release limits for items to be removed and reused.

Equipment or items shall be considered decontaminated when the specific performance criteria are met. Final visual inspection will document that items are free of visible waste-related residue and stains. Radiological field surveys and smears will document that the items may be released for unrestricted use.

4. DECONTAMINATION PROCESS

The process described below encompasses the decontamination of the PM-2A V-14 treatment equipment, heavy equipment utilized to move V-14 from the secondary containment area to the ICDF landfill cell, and the decontamination of the containers and equipment used for the remedial actions associated with the PM-2A V-14 treatment that have come in contact with radionuclides and hazardous waste. The goal of minimizing the generation of liquid wastes was considered when selecting the decontamination method.

4.1 Decontamination Approach

4.1.1 PM-2A Tanks

Two fundamental decontamination approaches are required for the PM-2A tanks remediation; one for the treatment of the PM-2A V-14 contents and one for the equipment used during transport and placement activities (e.g., tank transporter).

Radiation fields associated with the PM-2A tanks contents will be present before, during, and after removal of excess debris. Radiation dose will be kept as low as reasonably achievable during the removal process. The treatment efforts, therefore, should be performed using remote methods, were possible, that minimize personnel exposure. Chlorinated solvents (primarily tetrachoroethylene, designated as Environment Protection Agency hazardous waste number F001) have been confirmed to be present in the V-14 tank.

The criteria for efficient waste treatment of the V-14 tank include limiting quantities of airborne materials that could be a hazard to personnel or the environment and to minimize the generation of secondary and liquid wastes. The sample containers will be surveyed using field survey techniques for radiation fields at a low background location and a determination will be made regarding contamination.

Steps will be taken during the remedial treatment action to minimize the need for equipment decontamination. Contaminated equipment will be decontaminated by rinsing or wiping. Any decontamination solutions generated will be ICDF WAC compliant.

4.2 Contamination Prevention Methods

4.2.1 Heavy Equipment

High-capital-value equipment such as the crane and heavy hauler will be protected against contaminants. For example, a geosynthetic barrier will be placed on the transporter and saddles prior to placement of the tank. The barrier will serve two purposes: (1) minimize/eliminate the potential for contamination of the transporter and (2) minimize/eliminate the potential for the spread of contamination during transport.

4.3 Equipment Requiring Decontamination

A list of equipment to be used can be found in the remedial design section of the RD/RAWP Addendum 1 (DOE-ID 2004a) for the PM-2A V-14 treatment. The following types of equipment and other items associated with remediation may require decontamination:

- Small tools and sampling equipment

- Large equipment (crane, tank transporter, etc.)
- Waste containers (outer surfaces).

4.4 Decontamination Methods

4.4.1 Small Tools

Small equipment with only the possibility of external contamination will be decontaminated using a wipe-down method. Wipe-down consists of wiping the accessible surfaces of the item with a terrycloth wipe, or similar material, to remove any water or soils adhering to the surface. If necessary, the wipe may be soaked with ICDF WAC compliant decon solution and then used to wipe the equipment down. Subsequent to this, a wipe soaked with clean water will be used to complete the cleaning. Wipes, after use, are managed as secondary waste in accordance with the project WMP (INEEL 2004a).

4.4.2 Heavy Equipment

Heavy equipment used for the excavation, lifting, or transportation of the V-14 tank may require decontamination of the wheels, or tracks. The equipment will be wiped down using the same techniques as described above for small tools. This method will be somewhat time-consuming, however, and due to the variety of surface features of the equipment (e.g., rough surface track areas), hand wiping may only be a partially effective decontamination method. Therefore, hand wiping may only be a part of a graded decontamination approach. Any water generated from decontamination activities will be contained and placed in 55-gal drums or other suitable containers. These drums will be stored in a CERCLA waste storage area prior to the disposal activities as described in the Phase 1 WMP (INEEL 2004a). If wet decontamination methods are employed, resulting decontamination solutions will be collected for disposal. Collection methods may include such items as containment pans or construction of a lined decontamination pad, dependent upon the size of the equipment being decontaminated.

Objectives for radiological decontamination are shown in a graded approach. The graded decontamination approach described above will meet these objectives. This approach employs dry decontamination methods first (e.g., brushing, sweeping, and wiping).

4.5 Control of Exposure and Releases

4.5.1 PM-2A V-14 Treatment Site Releases

If wet decontamination methods are employed, secondary containment with volume to contain 110% (40 Code of Federal Regulations 265) of the liquid to be used during a single or continued decontamination activity will be provided to minimize the potential for release of decontamination solutions to the environment.

5. REFERENCES

15 USC 2601 et seq., 1976, "Toxic Substances Control Act," as amended.

10 CFR 835, 2004, "Occupational Radiation Protection," *Code of Federal Regulations*, Office of the Federal Register, January 1, 2004.

40 CFR 265, 2003, "Interim Status Standards for Owners and Operators of Hazardous Waste Treatment, Storage, and Disposal Facilities," *Code of Federal Regulations*, Office of the Federal Register, July 1, 2003.

42 USC 6901 et seq., 1976, "Resource Conservation and Recovery Act of 1976," as amended.

42 USC 9601 et seq., 1980, "Comprehensive Environmental Response, Compensation, and Liability Act of 1980," as amended. (NOTE: The 1986 amendment is cited as "Superfund Amendments and Reauthorization Act of 1986," [SARA].)

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PRD-183, 2004, "INEEL Radiological Control Manual," Rev. 7, *Manual 15A*, February 4, 2004.